



Opposite page: The classic 1949 Sportwagon glides in from another delightful flight. Its lines seem to combine the best of aesthetic appeal with functional design—true tribute to the tremendous artistic talent of the late Cal Smith. Above: Our author has taken what was a standard for sport Free Flight and modified it slightly to accept a modern-day radio control system.

The argument continues that RC Free Flight is too much of a contradiction in terms. Yet there can be no denying that if you live in an area of limited space, it may be your only chance to enjoy the special beauty of a model like this one.

■ Dr. D. B. Mathews

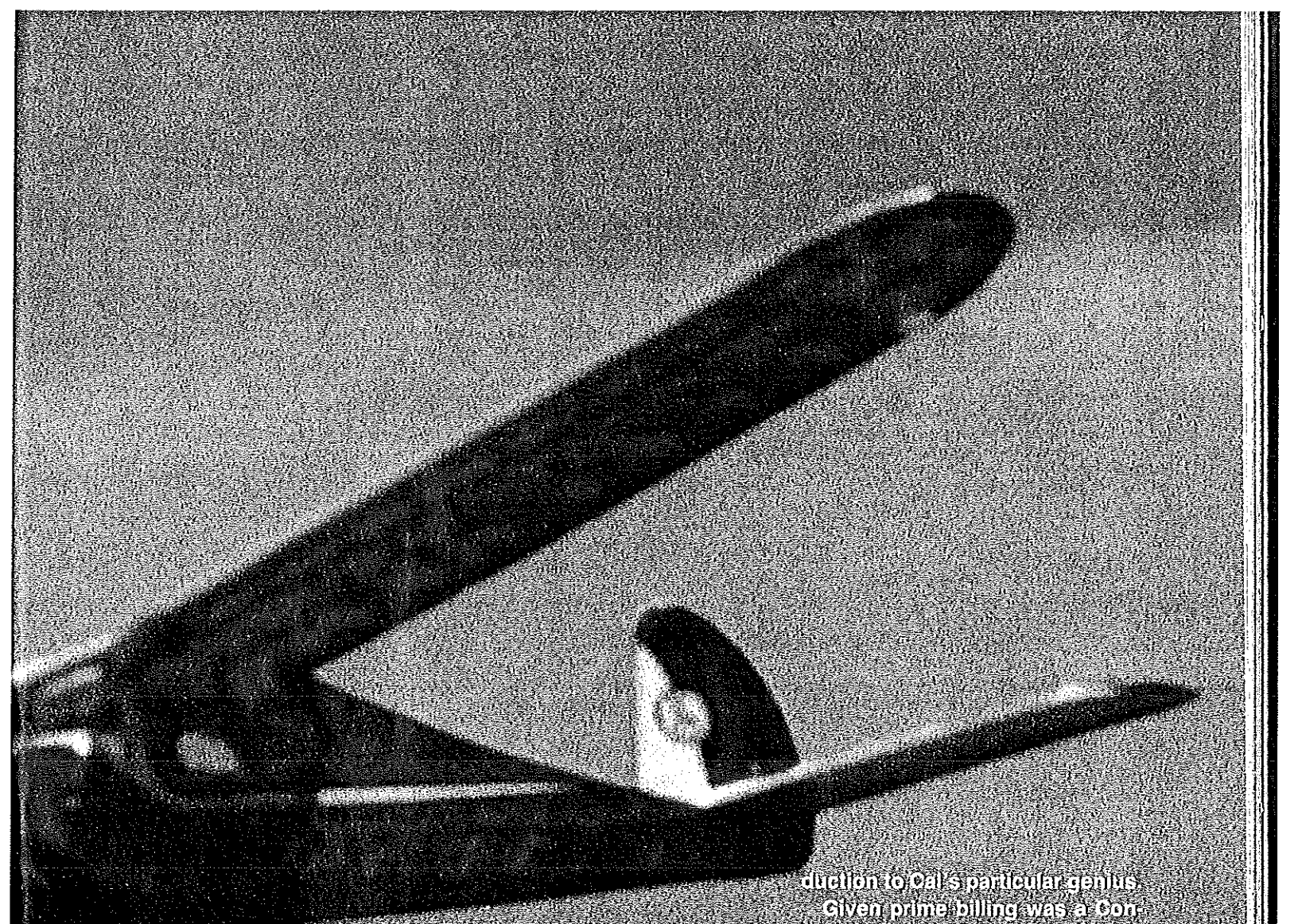
MENTION CAL SMITH'S name to anyone who was building model aircraft in the early 1950s, and he'll likely get a bit glassy-eyed with memories. S. Calhoun Smith was the consummate magazine contributor, a prolific author of technical pieces on both modeling and full-scale aviation who was also one of the top illustrators of his time. But his influence went further. This man of many talents also designed and published models; and his competent, forward-thinking, often innovative model airplane designs

endure as classics even today.

Cal's Sportwagon interested me from the beginning, when he first presented it in a two-part article in the June and August 1948 issues of *Flying Models* magazine, and my fascination with this sport Free Flight model has never left me. Recently, I revived Cal's prototype and added Radio Control assist. In part, the decision to do so came from my hunch that, were he alive today, Cal himself would want to redesign the

SPORTS

Cal Smith's



Sportwagon to take advantage of modern equipment.

After Cal's untimely death from heart disease in July 1964, Conde Nast Publishing devoted most of its 1965 edition of the *American Modeler Annual* to a se-

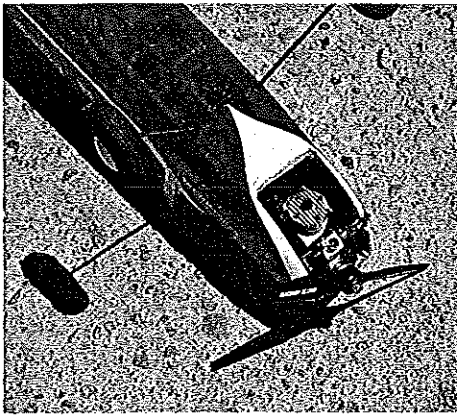
lection of his works. This tribute represented only a small fraction of his contributions to *American Modeler* alone. Such was Cal's output that contemporaneous modeling periodicals could easily have filled their own issues with works they had published over the years.

A sampling of his designs from that 1965 *American Modeler Annual* makes an interesting intro-

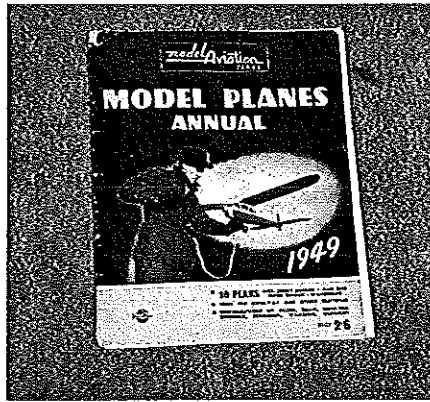
duction to Cal's particular genius.

Given prime billing was a Control Line Skyraider with which Cal had won the first-ever Navy Carrier event at the 1950 Dallas Nats. It was powered by an O&R 60 ignition engine with a front intake using two sets of points to obtain a high and low engine speed. Insulated flying lines were used to pass 45 volts from a belt-clipped battery up into a relay which switched from high to low points. This is innovative even by to-

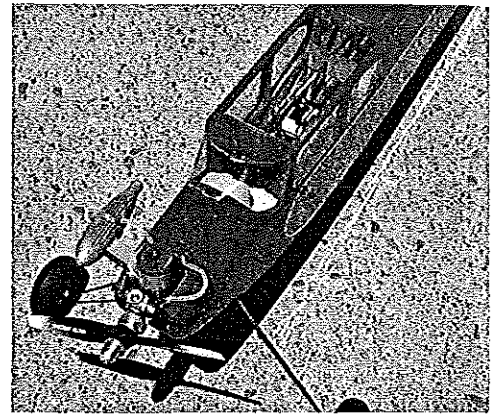
WAGON



For an alternative power source Doc tried a Davis Dieselled O.S. .10. The model is small enough to be held inverted easily for improved starting. The diesel engine swings a large prop for its size, and its torque makes it and the Sportwagon an ideal combination.



Flying Models often swapped construction articles with British modeling publications of the time. Here on the cover of one of their annual plans books is Cal Smith starting the ignition engine on his original Sportwagon.



The Fox .19 BB proved to be a super running engine, though perhaps a bit too much for such a light model. The Sportwagon was capable of steep climbs at only half throttle.

day's standards, and one can only speculate what a provocative idea it must have seemed 35 years ago.

Other CL subjects mentioned were a F-86 Sabre fitted with a Dyna Jet, and a four-engined Consolidated B-24. Cal did accompanying cover illustrations for both these planes when they originally appeared in *American Modeler*.

Also shown was his Blunderbus, from the October 1953 issue of *Air Trails*, which was the forerunner of *American Modeler*. The Blunderbus was a Free Flight cutie designed around the 1/2A engines which had just been introduced at the time. Even this simple model was embellished with Cal's artwork in the form of an isometric drawing of the wire cabane system for the parasol.

The Blunderbus was spotlighted several years ago in yet another magazine, resurrected as an RC sport plane. Cal, in fact, was himself no stranger to RC airplanes. Selected for the *Annual* was his single-channel K&B .13-powered Monocoupe 90 (with an optional trike gear, no less) from the January 1955 issue; but other examples of his expertise in RC abound. Cal designed the Wonderwings (a biplane), an Aeronca Champ in two-foot scale, a Fokker D-8, and a Sopwith Biplane. The latter was one of the very earliest Giant Scale models.

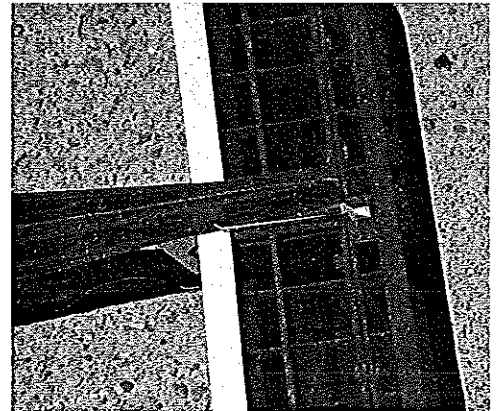
His interest in RC extended to model



The rudder pushrod passes through a slot in the fuselage top. Small control horns should be used to give the rudder plenty of throw.

boats as well, where, publishing such diverse things as a surface submarine, a bunker boat, and a missile ship (in collaboration with Frank Lashek), he was something of a pioneer. The *Annual* spotlighted Cal's Maverick unlimited hydro. This article included line drawings of the construction as well as a charcoal illustration of the boat running across a pond, with the operator thumbing merrily away on a single-channel transmitter.

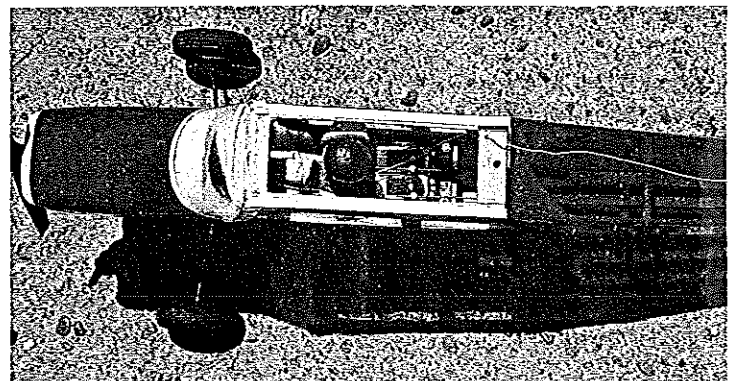
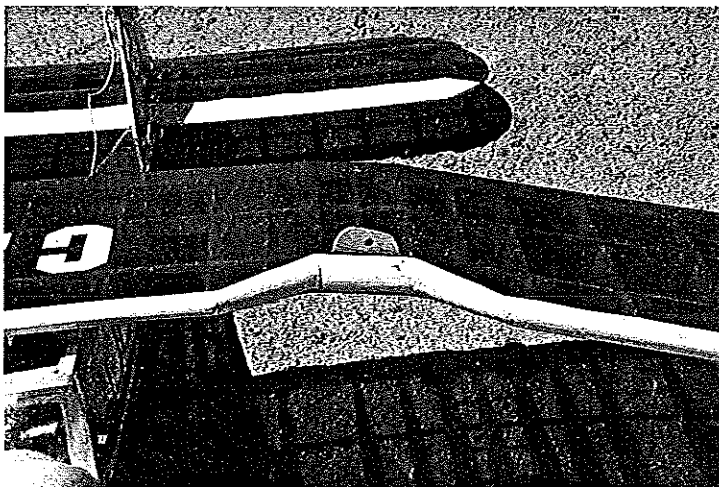
Other of his artworks featured in the *Annual* were a Meyer's Little Toot and a profile Little Toni, both of which, like the F-86 Sabre and the Consolidated B-24, had been



The elevators are built integrally with the stab, then cut out and hinged. Mild aerobatics can be done with the clevis connected to the bottom of the elevator horn as it is here.

paired with cover illustrations in the original issues.

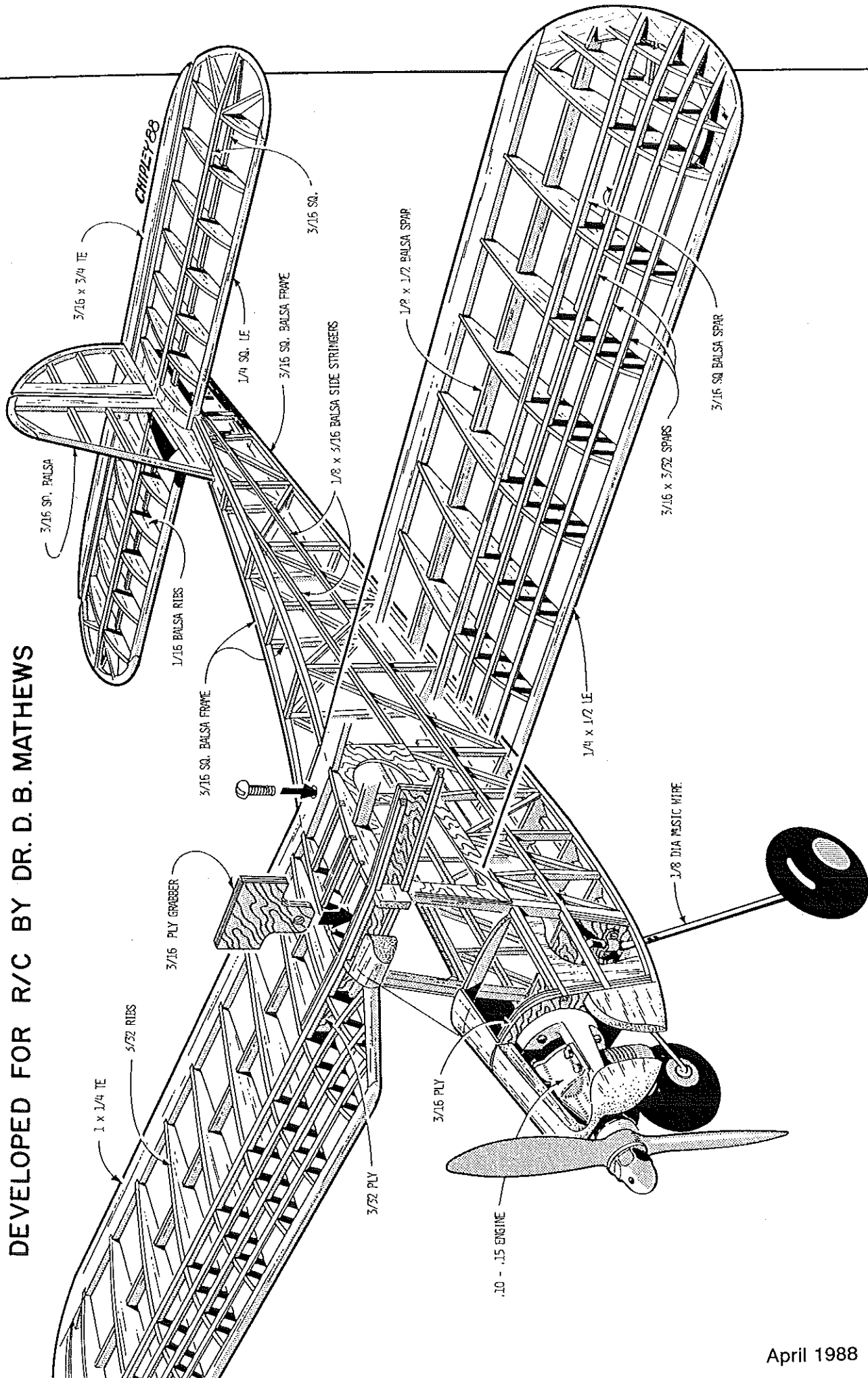
Cal earned immense distinction as an illustrator. His vivid artwork added a singular dimension to his construction articles, equaled by few others either before or since. His brilliant use of subtle color, coupled with an incredible accuracy and a novel way of expressing movement, has seldom been duplicated. Cal's cutaway perspective drawings compare favorably with those of the late Hank Clark. His cover art adorned the faces of innumerable magazines, most notably the *American Aircraft Modeler*.

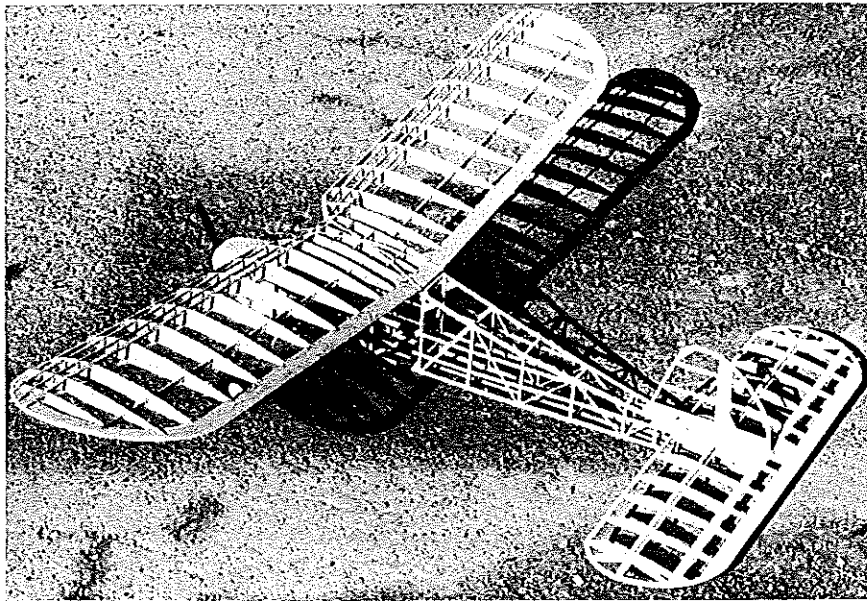


Left: Doc refers to this method of wing attachment as a "grabber." It has been used on several designs with minimal problems, and it certainly makes for a clean wing mount with little extra effort. Right: Ace Bantam Midget servos, a 250 mAh battery, and a Silver Seven receiver all fit nicely into the fuselage. Note the wing dowel detail.

CAL SMITH'S SPORTWAGON

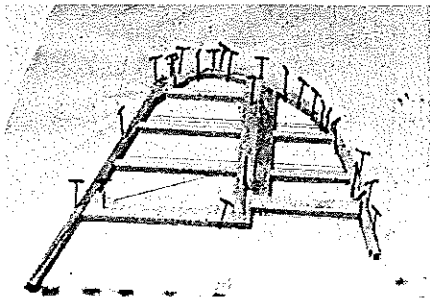
DEVELOPED FOR R/C BY DR. D. B. MATHEWS





It's beauty like this that keeps selling the translucent coverings. With such a gorgeous arrangement of sticks, who could bear to hide them. This structure, typical of all of Cal's designs, provides rugged strength without the penalty of excessive weight. Doc decided to modify the original symmetrical airfoil of the stab to an easier-to-build flat-bottom section.

Among his diverse cover subjects were B-57s, P-47s, a Fokker D-8, Goodyear racers, a missile cruiser, an X-15, an Unlim-

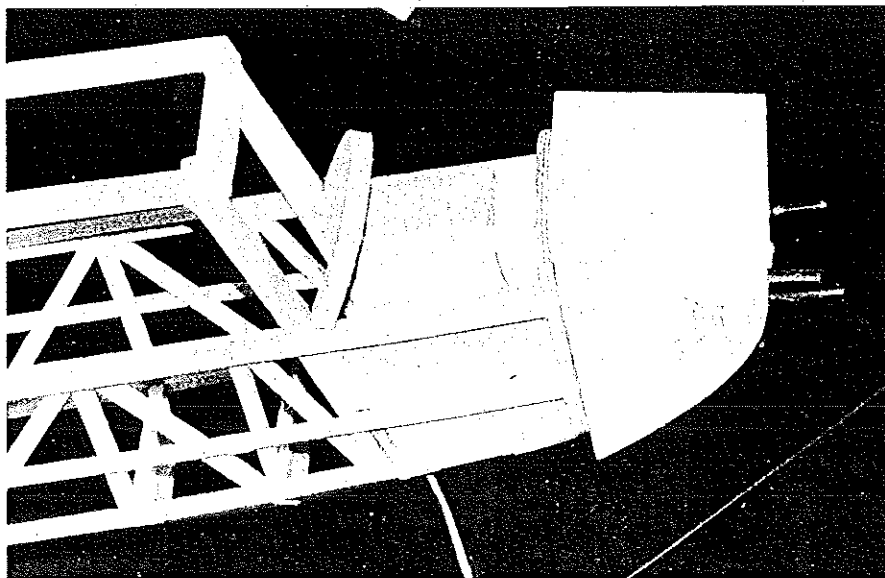


The fin and rudder are constructed by laminating strips of balsa soaked in ammonia water to make them flexible. Spreading aliphatic resin (Elmers' glue) along the seams bonds the laminations which are formed on the plans or around a piece of foam board.

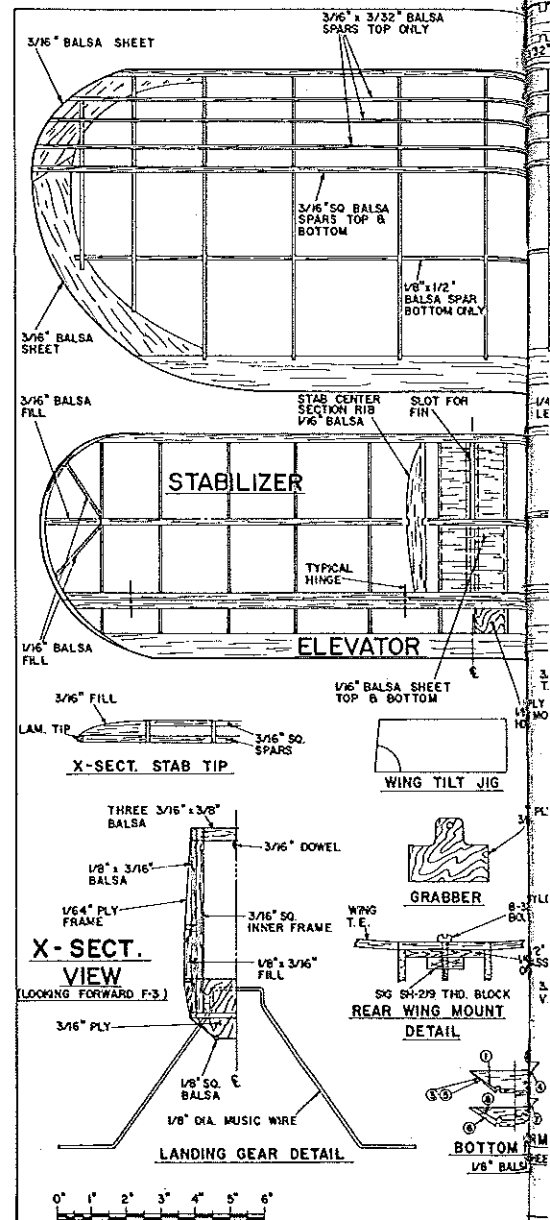
ited Hydro, Sopwith Pups, a Stitts Playboy, and even Glenn Curtiss racing Barney Oldfield's old Number 99. These were action flight settings of incredible beauty, often with a companion model design article in the same issue of the magazine.

Although Cal Smith gave me countless hours of pleasurable building and reading, I'm in no way an authority on the life or character of this remarkably accomplished man. Fellow modeler Bill Winter, on the other hand, knew Cal well. In fact, Bill was one of Cal's earliest and most influential mentors. To Bill, Cal was "one of my Boys." From Bill's eulogy to his former pupil and lifelong friend in the October 1964 issue of *Model Airplane News*:

"We have all suffered an inestimable loss. For almost as long as we can remember, he was the source of numberless de-



The nose is made of 3/16-in. balsa sheeting that is carved and sanded to the aesthetic shape that Cal's artistic eye originally provided. Note the bottom support piece for the windshield.



signs, articles, illustrations, cover paintings, box wraps, and books that helped make this hobby, and others, so enjoyable. It is in this light that most of us saw and remember him. Cal's versatility, however, went beyond these things. One was always surprised by his constant excursions into other things in which he was an instant, authentic expert.

"He exhibited a typical interest in everything around him—he was an expert at scuba diving, spearfishing, ice boating, and wonderfully self-illustrated books which equaled if not surpassed what had gone before in all those fields.

"Our first recollection of Cal goes back to 1945 when, as an aviation editor, we met him through *MAN* cover artist Jo Kotula. Smitty was just out of the Air Force where, during WW II, he participated in the preparation of flying safety manuals. You could ask the man to do anything; if he tackled it, it was done to perfection. If he drew the Smog Hog plans, or wrote a getting-started article, or painted a cover or did a how-to-

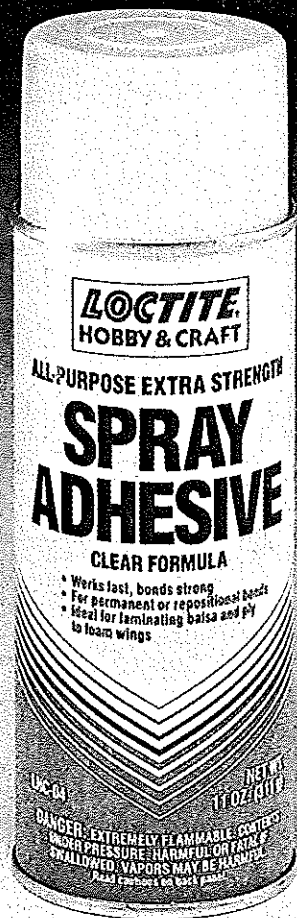
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and over again in my own designs?

Cal powered his prototype with a Bantam .19 on ignition, but had also been known to use a Forster .29! The British *Model Plans Annual* suggested using an E. D. Comp Special, a Mills 2.4, an Allbon 2.8, or the 'K' Vulture. I've found that a diesel engine of roughly .15 cu. in. capacity fits Cal's intentions more closely than a Forster 29!

I can envision the RC Sportwagon having appeal for several different groups of modelers. The slowly growing numbers of Nostalgia RC enthusiasts would certainly be interested. Old-timers who share my reverence for the original Sportwagon would want to try the RC version, too. Maybe the modeler who's just shopping for a really "sexy"-looking sport RC would also find that this one filled the bill. Whoever you are and whatever your reason, here is how to build yourself a Sportwagon.

Construction. Cyanoacrylate (CyA) is the primary adhesive used throughout. Aliphatic resin (Sig Bond, etc.) is used to laminate the various outlines, and five-minute epoxy to adhere the plywood parts.

All wood is balsa unless otherwise specified; use medium-weight 'C' grain. Strip wood should be clear of knots and also be of medium weight. While, as is customary with Cal's models, the structure is on the strong side, it is at the same time well stressed and relatively easy to fabricate.

Wing. Develop a master plywood rib template by tracing onto the wood, placing carbon paper between the latter and the underside of the plans. Use this pattern to stack cut the ribs. Alternatively, cut them out with a knife using a metal template.

Wing tip segments are constructed in the same way, and should be preassembled before installation. Notch the trailing edge stock with a razor saw, or better yet with the blade reversed in a jigsaw.

Taper the rear spar before assembly in order to have a reference point for the tip. Build the center section integrally with the left panel, making sure that the ribs are vertical (in contrast to the tilt of the outboard rib, which has been set with the jig).

Place scraps of 1/16-in. sheet under the leading edge assembly and the building surface. Lay the wings down, working from the spars forward and making sure that the ribs are positioned properly. The tip ribs can be trimmed from the master ribs by slicing them from the bottom.

The center section leading edge filler sheet is best left uncontroled until the wing panels have been joined. Obviously, the outboard filler should be cut to match the incline of the ribs. After sanding in the dihedral bevel with a block against a table face, join the panels using five-minute epoxy and clothespins.

Custom fit the ply dihedral brace to each wing by cutting a slot through the ribs against the spar faces. Hacksaw blades taped together work well for this. Slide a

Continued on page 128

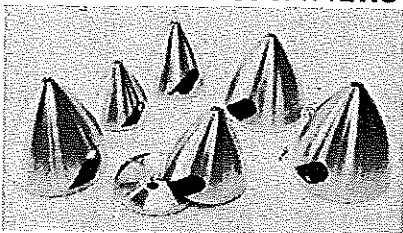
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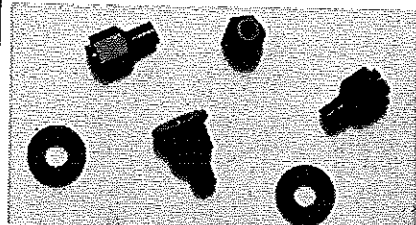
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beck suggest that the two D-cells I had would give a few spurts of amperage, then poop out, he also phoned to explain my problem—and backed that up by sending an Eveready 1.5-volt battery which I couldn't obtain elsewhere.

Why is that battery so hard to find? You can bet I sent a letter to Union Carbide Corp. to ask why no #IS6 1½-volt batteries were in the hobby shops—and no advertising in the modeling magazines. It's one item we surely need.

My second problem was with a Cox Black Widow .049 in which "Murphy" claimed one screw (it just vanished) that held the backplate and fuel tank to the engine. No magnet could find it.

I sent Cox Hobbies a letter requesting one screw for a Black Widow .049 and enclosed \$1.00 cash. Several weeks later I received their current catalog, price list, and a packet of screws and parts for an .049 overhaul kit retailing for \$1.05. No payment due.

Golly! This old veteran's heart goes out to these two American manufacturers in gratitude for the help they gave freely.

Lee A. Hoffman
Banning, CA

These two firms are representative of many in the aeromodeling field that really strive for a high level of customer satisfaction. Maybe that's because most of them are run by modelers for modelers. All of us consumers are really quite lucky, you know, to have so many quality things we can purchase to make our modeling easier and/or more enjoyable.

Sportwagon/Mathews

Continued from page 30

ply blank into the slot and mark the outline with a pencil. Cut this out, and epoxy in place. Do not install the "grabber" at this time!

Carve and sand the leading edge, tips, and trailing edge to contour. Although Cal covered the leading edge with 1/2 sheeting, for obvious reasons that doesn't suit our present purposes.

Fuselage. Standard box-type construction

is employed here: One frame is built over the other using scraps of masking tape to prevent sticking. I substituted a more modern radial mount for the breakaway engine beams in the prototype.

It's a good idea to assemble all the formers and bulkheads while the fuselage frames are curing. Again, use the carbon paper, and build jig frames #3 and #4 directly over the drawings.

Remove the frames, and pop them apart using a table knife. Sand a bevel into the tail posts, then place the right frame over the drawing. Trial fit and adjust the formers, if necessary, to fit snugly into the frame. Attach with CyA, making sure they are at right angles in all planes.

Install the left frame onto the formers, checking alignment with a triangle, etc. I prefer to leave the box on the building surface, jacking up the tail post by exactly one-half the fuselage width. Glue the left frame in place, then cut the crosspieces in pairs using the top view as a guide.

An alternative method would involve removing the box and setting it directly over the top view, then constructing it from there. In either case, be sure that the tail post is in the center of the midline and that the stab seat is level.

Bend the landing gear over the drawing, using large vise-grip pliers and a bench vise. A cutoff wheel is also most useful here. Do not attempt to rebend a mistake; just toss it and start over. This unit is held to #3 with nylon clips. It's wise to predrill #3 before installing the gear.

Attach the bottom formers and stringers. Moisten the top sheeting with ammonia water, and pull it down over the firewall and former A. The side stringers taper to the rear, and the filler strips around the windows taper up to the wing seat. CyA the 1/4 ply window frames to the stringer and filler strips.

Sheet plastic windows will be attached to the inside of the frames after the fuselage has been covered. This makes a very neat and easily installed window treatment.

Attach the wing saddle fillers and dowel with five-minute epoxy. Make sure the dowel is in the center and runs level along both planes.

Joining the wing and fuselage. Hold the

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“grabber” against the ply brace with clamps, and slide the wing over the front dowel. Adjust so that the center section of the wing is parallel with the fuselage sides. Use a piece of heavy string which has been pinned to the tail post to check that the wing is exactly at right angles to the fuselage. Measure from a common point on both tips to the tail post, adjusting until it is exactly even.

Mark this point on the grabber and epoxy it to the joiner. Return the wing to the seat, and recheck with the string. Using a drill size corresponding to that of your nylon bolt, drill down through the hardwood trailing edge into the underlying hardwood block. Screw the bolt into the pre-tapped Sig block, pull it up against the hardwood wing saddle, and hit with CyA.

A tapped hole and bolt could be used in-

stead, but the hardwood of the rear saddle would probably need to be of thicker stock. Initially, I tried Cal's rubberband wing hold-on technique, but was unable to keep the wing from sliding to the rear. Perhaps a single dowel running forward from where we have the grabber dowel would work.

Empennage. The original Sportwagon used a symmetrical stab section. In constructing this and joining it to the fuselage, I used a flat-bottom section for the sake of simplicity. I also chose a flat fin-rudder assembly without an airfoil.

Make the laminated outlines by moistening strips of balsa with ammonia water and spreading aliphatic resin along the seams. These laminations are then formed either over the plans using pins along the perimeter, or over foam board patterns.

The horizontal stabilizer ribs are constructed in much the same manner as the wing ribs. Lay the sheet center section down, then add the spars, ribs, and leading and trailing edges. Use a straightedge to mark and cut $\frac{3}{8}$ -in. slots in the ribs for the two hinge line spars. CyA in place, trim the edges for the tips, and install.

Use a sanding block for final contouring of the hinge spars so that they match the ribs. Add the top center section sheeting, allowing the fin slot. After final sanding, separate the elevator portion and cut slots for the hinges, but do not install these permanently.

Since the elevator horn screw plate will be under the covering, CyA it to the Lite Ply base. The fin construction is self-explanatory.

Installing the hardware. I decided on inverted mounting for the engine, but it can also be installed in either the upright or sidewinder position. Tank position will vary accordingly. I used a small, 2-oz. Perfect Brand metal tank, replumbed for rear pickup and top vent. A small Sullivan RC

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tank will also fit. The throttle system I used has the throttle cable enclosed in a nylon rod.

The battery should be placed alongside the tank and as far forward as possible. A Du-Bro switch mount was positioned on a scrap filler in my model.

I used 1/4 x 1/4-in. balsa pushrods with EZ connectors on one servo arm; on the other, I threaded wire and clevis. Nylon rods could also be used, but the rudder unit does exit on top of the fuselage.

The Sportwagon must balance where shown on the plans. We came out without needing ballast; however, other engine-

and-equipment combinations may require adding ballast at the nose or tail.

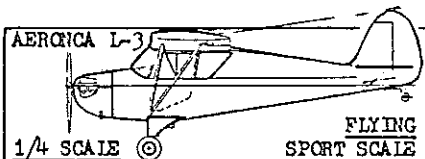
Continued on page 132

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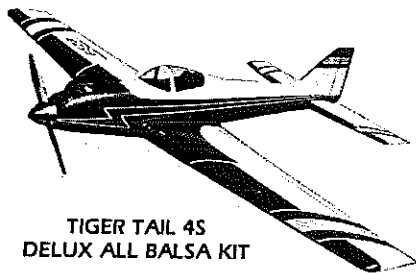
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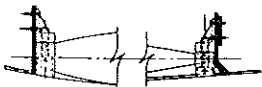
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Check for free movement of all controls, and set up the throws.

Covering: Following my usual practice, I used transparent MonoKote. Cal had suggested lightweight silk or tissue, however, and the model certainly would be delightful covered in silk. One of the new iron-on fabrics in the transparent colors would also be a viable alternative.

I sprayed Poly U trim over the MonoKote. A light rubbing with 000-grade steel wool aids adhesion. My preference is Sig Stripe Rite for masking. Brushing on a coat of Sig clear Skybrite is great for preventing bleeders. I also used the Stripe Rite for pin-stripes. The letters are vinyl stick-on ones from an office supply store.

Banner wheels, as used on the prototype, certainly add appearance points.

I used samples of a new hinge material on my model, but recommend Klett or Sig pinned hinges. To safeguard them, drill a hole and insert a small piece of toothpick, securing with CyA.

I covered the Sportwagon with the RC equipment in place. I hadn't done it that way for quite some time, but it really is a simpler, easier effort.

Cut the window holes out of the shrunken MonoKote. Cut the window plastic to outline over the plans, using Wilhold RC 56 adhesive to secure the windows inside the frame. The windscreen will need to be trimmed slightly for a good fit. Position it inside the ply at the rear and onto tiny cut-outs in the MonoKote. Stripe Rite tape was used at this joint.

I primed the tank and engine compartments with Skybrite and painted them with Poly U.

Flying: Remember how we used to fly sport Free Flight and dream of the day when we'd be able to make them turn back and land at our feet? Want to bet that thought went around in Cal Smith's mind in 1948? Well, by golly, 37 years later we can!

I know that some purists detest the contradiction in the term, but what we have here is RC-assisted Free Flight. In this incarnation, Cal's "sexy little Free Flight" gets to fly around merrily—and we get to watch, giving occasional directional changes from

the ground. Point her nose into the wind, advance the power, and up and away she goes. The radio may be needed for slight course corrections, and we might change the elevator a bit to adjust the rate of climb or to keep her from soaring too high; but she flies, and we adjust.

If chugging around looking pretty and realistic in the air isn't what you're after, then use a Sportwagon to practice maneuvers like stall turns and (yes) lazy loops. The model has excellent versatility; Cal Smith did his homework well.

Men with Cal Smith's extraordinary gifts and energy don't come along very often. Artist, author, and model designer, Cal was a sort of Renaissance man of model aviation. In closing his 1969 tribute in *Model Airplane News*, excerpted above, Bill Winter declared, "Forgotten, Cal will never be." I hope that updating his Sportwagon will help to keep the memory of its designer alive.

Radio Technique/Myers

Continued from page 33

Tach 2 still works, so it must be a good idea. Thanks, Bob.

Making use of an idea that I presented in this column back in October '79, the Accu-Tach 2 handbook suggests that it be used to evaluate your RC system installation. All you do is cut one battery lead in an aileron adapter cable, then connect the cut ends to a milliammeter like Accu-Tach 2. Put the adapter between your flight pack and your switch harness. Turn on transmitter and receiver, then observe the current being drawn when you try every control at its extreme position, with trim (if available) at the same extreme.

If you can stall a servo at any position, you will see the amps jump way up, and stay up, which is your warning to reset your throttle stop, clear the epoxy out of your hinges, make additional clearance for pushrods, etc. You can put your modified aileron extender cable between a servo and the receiver to evaluate any particular servo installation for problems.

This may not work with every system and installation. The insertion resistance of Accu-Tach 2, or the oscillator which strobes the display, may drive your system into instability. If that happens, you'll have to make the measurement with an analog VOM (the kind with a pointer) using the 500 mA range.